AIRPORT INFRASTRUCTURE PLANNING

PURDUE ROAD SCHOOL
EST. 1914
TRANSPORTATION CONFERENCE & EXPO

HNTB

Agenda

- Introduction
- Methodology
- Results

Introduction

- Airports under continual development
- Underground utilities often after thought
- Methodology helps plan

Introduction (2)

- What utilities?
  - Storm water
  - Sanitary sewer
  - Potable water
  - Fire protection water
  - Jet Fuel
  - Electricity
  - IT/Telecom
  - Industrial Waste

Methodology

- Condition Assessment
  - What is the current shape of assets?
  - Age?
  - Visual Inspection

Methodology (2)

- Condition Assessment
  - What is the current shape of assets?
  - Age?
  - Visual Inspection

Methodology (3)

Methodology (4)

Methodology (5)

Methodology (6)

- Capacity Assessment
  - Can the infrastructure handle future loading?
  - Interviews with stakeholders

Methodology (7)

- Modeling
  - Storm, Sanitary, Electrical, Potable Water,
- Future Planning
  - Jet Fuel, IT/Telecom

Methodology (8)

Table 2: Current Domestic Water Demands with Recycled Water System Implemented				
Main Users	Average Domestic Water (MGD)	Peak Domestic Water (MGD)	Average Recycled Water (MGD)	Peak Recycled Water (MGD)
T1	0.06	0.08	0.07	0.10
T2	0.03	0.04	0.04	0.06
T3	0.02	0.03	0.08	0.11
IT	0.18	0.25	0	0.00
Car Wash	0.01	0.014	0.04	0.06
Cooling Towers	0	0.00	0.23	0.32
MOC	0.1	0.14	0.1	0.14
Superbay	0.02	0.03	0	0.00
Office Buildings/Irrigation	0.12	0.17	0.02	0.03
Input to aircraft	0.05	0.07	0	0.00
Losses	0.09	0.09	0	0
TOTAL	0.68	0.92	0.58	0.81

Methodology (9)

Building Name	Building Type	Gross Building Square Footage	Roof Area (square footage)	Fire Flow Classification	Fire Protection Water Flow (GPM)	Fire Flow Duration (Hours)	Year Built
FBO Hangar	General Aviation	25000	25000	4	2750	2	1997
FBO Hangar C	General Aviation	25000	25000	4	2750	2	2014
FBO Terminal 1052	General Aviation	12000	12000	4	2000	2	1997
FBO Terminal 1054	General Aviation	25000	25000	4	2750	2	1997
FBO Fuel and Maintenance Shop	General Aviation	5816	5816	4	1500	2	1997
Airfield Operations Vehicle Garage	Parking	11496	11496	3	2250	2	2015
Airfield Operation Building	Airport Administration	9882	9882	4	1750	2	2015
Police Main Training Facility and Shooting Range	Police and Fire	1791	1791	3	1500	2	1989
Superbay Hangar	Airline Support	255800	255800	4	8000	4	1971
Emergency Rescue Fire Fighting Facility (ERF #2)	Police and Fire	14012	14012	3	2500	2	1994
GSE Building 1070	GSE maintenance	9972	9972	4	1750	2	1950
Field Lighting Building #1	Infrastructure	4388	4388	3	1500	2	1980
Field Lighting Building #2	Infrastructure	3000	3000	3	1500	2	1970
Fuel Farm	Infrastructure	N/A	N/A	3	1500	2	N/A
Water Tanks	Infrastructure	N/A	N/A	3	1500	2	N/A
Coast Guard Air Station	Coast Guard	31251	31251	4	3250	3	N/A
Coast Guard Air Station	Coast Guard	12727	12727	4	2000	2	N/A
Coast Guard Air Station	Coast Guard	13999	13999	4	2250	2	N/A
SFO ITT	Infrastructure	5850	5850	3	1500	2	N/A
Emergency Rescue Fire Fighting Facility (ERF #2) Ancillary	Police and Fire	4937	4937	3	1500	2	1994
United Airlines Maintenance Operations Center		177479		4	8000	4	
United Airlines Maintenance Center - Bldg 84		654134		4	8000	4	
United Airlines Maintenance Operations Center DOCK		122956		4	8000	4	
UAL S.F. Maintenance Center A	Airline Support	0	1841665	4	8000	4	N/A
UAL S.F. Maintenance Center B	Airline Support	0	See 800A	4	8000	4	N/A
UAL S.F. Maintenance Center C	Airline Support	0	See 800A	4	8000	4	N/A
UAL S.F. Maintenance Center F	Airline Support	0	See 800A	4	8000	4	N/A
UAL S.F. Maintenance Center G	Airline Support	0	See 800A	4	8000	4	N/A
UAL S.F. Maintenance Center H	Airline Support	0	See 800A	4	8000	4	N/A
City College of S.F. Airport Campus Ancillary Building	Education	1540	1540	2	1500	2	N/A

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Methodology (10)

SFO Stormwater Demand

Pump Station	Area	Existing PS Capacity (FIRM)	Drainage Area	2-Year Storm	5-Year Storm	10-Year Storm	25-Year Storm	50-Year Storm	100-Year Storm
		(GPM)	(Acres)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)	(GPM)
1D		72,000	609.11	321,859	403,562	470,409	566,967	643,718	722,945
1A		40,000	139.33	73,625	92,315	107,606	129,694	147,251	165,374
1B		40,000	145.52	76,892	96,410	112,380	135,448	153,784	172,711
1C		40,000	134.74	71,197	89,270	104,057	125,416	142,394	159,920
2		57,000	645.32	340,989	427,548	498,369	600,666	681,979	765,915
6		22,000	49.78	26,303	32,980	38,443	46,333	52,606	59,080
7		5,600		0	0	0	0	0	0
8		820		0	0	0	0	0	0
9		50,000		0	0	0	0	0	0
10		1,600		0	0	0	0	0	0
11				0	0	0	0	0	0
12		2,000		0	0	0	0	0	0
13				0	0	0	0	0	0
14				0	0	0	0	0	0
15				0	0	0	0	0	0
16		540		0	0	0	0	0	0
17		150	20.84	11,012	13,807	16,095	19,398	22,024	24,735
18			29.80	15,745	19,742	23,012	27,735	31,490	35,365
19		140		0	0	0	0	0	0
20				0	0	0	0	0	0
21		10,000		0	0	0	0	0	0
22		2,400		0	0	0	0	0	0
23		50		0	0	0	0	0	0

Peak flow results utilizing rational equation and does not account for storage

FAA requires 5-year event

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Methodology (11)

Year	Cumulative Peak Month Average Daily Aircraft Operations[1]	Projected New Aircraft Operations	% Change	Peak Daily Fuel Usage (bbl)	Cumulative Annual Fuel Usage (Gallons)[3]	Cumulative Peak Month Average Daily Aircraft Departure Operation[2]	Projected New Departure Operations	% Change	Peak Daily Fuel Usage (bbls)	Cumulative Annual Fuel Usage (Gallons)[3]
2017[3]	1253			89,462	1,364,370,000	654			89,462	1,364,370,000
2018	1307		4.31%	93,318	1,423,174,347	659		0.73%	90,119	1,369,418,169
2019	1357	49.7	3.80%	96,864	1,477,254,972	663	3.7	0.56%	90,621	1,377,041,263
2020	1406	49.7	3.66%	100,410	1,531,335,597	666	3.7	0.55%	91,122	1,384,664,358
2021	1456	49.7	3.53%	103,956	1,585,416,223	670	3.7	0.55%	91,624	1,392,287,452
2022	1459	2.7	0.19%	104,150	1,588,360,567	671	1.4	0.21%	91,819	1,395,251,036
2023	1461	2.7	0.19%	104,343	1,591,304,911	673	1.4	0.21%	92,014	1,398,214,619
2024	1464	2.7	0.19%	104,537	1,594,249,256	674	1.4	0.21%	92,210	1,401,178,202
2025	1467	2.7	0.19%	104,731	1,597,193,600	676	1.4	0.21%	92,405	1,404,141,786
2026	1470	2.7	0.19%	104,925	1,600,137,945	677	1.4	0.21%	92,600	1,407,105,369
2027	1472	2.7	0.18%	105,119	1,603,082,289	679	1.4	0.21%	92,796	1,410,068,952
2028	1475	2.7	0.18%	105,312	1,606,026,633	680	1.4	0.21%	92,991	1,413,032,535
2029	1480	5.0	0.34%	105,669	1,611,455,003	683	3.2	0.47%	93,429	1,419,673,788
2030	1485	5.0	0.34%	106,026	1,616,883,373	686	3.2	0.47%	93,866	1,426,315,041
2031	1490	5.0	0.34%	106,383	1,622,311,744	690	3.2	0.47%	94,304	1,432,956,294
2032	1495	5.0	0.34%	106,740	1,627,740,114	693	3.2	0.46%	94,741	1,439,597,547
2033	1500	5.0	0.33%	107,097	1,633,168,484	696	3.2	0.46%	95,179	1,446,238,800
Avg/YR					106,534					94,340
Avg %/YR					0.98%					0.37%
% Total	14.77%		13.97%		14.76%	5.61%		5.47%		5.61%

Indicates medium fuel usage forecast

Indicates low fuel usage forecast

Methodology (12)

Year	Existing Capacity (bbl)	Days Storage Existing	Base Case Capacity (bbl)	Days Storage Base Case	Alt #1 Capacity	Days Storage Alt #1	Peak Daily Consumption (bbl)[1] Low Forecast
2017	285,000	3.2	285,000	3.2	285,000	3.2	89,462
2018	285,000	3.2	420,000	4.7	474,000	5.3	90,119
2019	285,000	3.1	420,000	4.6	474,000	5.2	90,621
2020	285,000	3.1	420,000	4.6	474,000	5.2	91,122
2021	285,000	3.1	420,000	4.6	474,000	5.2	91,624
2022	285,000	3.1	420,000	4.6	474,000	5.2	91,819
2023	285,000	3.1	420,000	4.6	474,000	5.2	92,014
2024	285,000	3.1	420,000	4.6	474,000	5.1	92,210
2025	285,000	3.1	420,000	4.5	474,000	5.1	92,405
2026	285,000	3.1	420,000	4.5	474,000	5.1	92,600
2027	285,000	3.1	420,000	4.5	474,000	5.1	92,796
2028	285,000	3.1	420,000	4.5	474,000	5.1	92,991
2029	285,000	3.1	420,000	4.5	474,000	5.1	93,429
2030	285,000	3.0	420,000	4.5	474,000	5.0	93,866
2031	285,000	3.0	420,000	4.5	474,000	5.0	94,304
2032	285,000	3.0	420,000	4.4	474,000	5.0	94,741
2033	285,000	3.0	420,000	4.4	474,000	5.0	95,179

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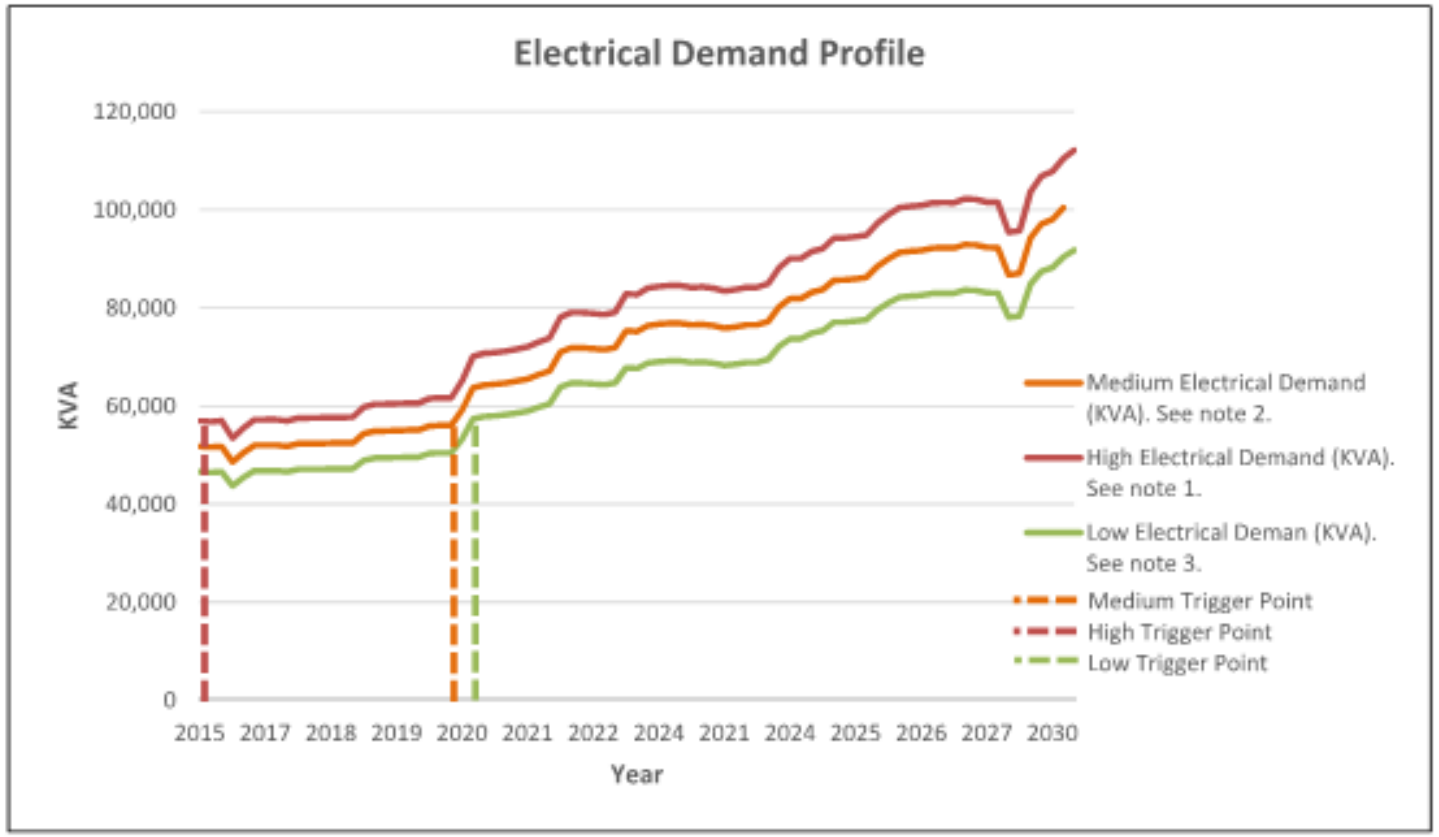
Methodology (13)



Results

- Planning Guide
  - Future needed projects
  - Eliminate surprises

QUESTIONS?

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